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Providing a Medical Home: The Cost of Care Coordination Services in a Community-Based, General Pediatric Practice

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ABSTRACT. *Objective.* To determine the cost of unreimbursable care coordination services for children with special health care needs (CSHCN) in 1 community-based, general pediatric practice.

Methods. A measurement tool was developed to quantify the precise activities involved in providing comprehensive, coordinated care for CSHCN. Costs of providing this care were calculated on the basis of time spent multiplied by the average salary of the office personnel performing the care coordination service. In addition, data were collected regarding the complexity level of the patient requiring the service, the type of service provided, and the outcome.

Results. During the 95-day study period, 774 encounters that led to care coordination activities were logged, representing service provision to 444 separate patients. When these encounters were examined on the basis of clinical complexity of the patient, the most complex patients constituted 11% of the population of CSHCN yet accounted for 25% of the encounters. In addition, care coordination activities for these clinically complex CSHCN engaged office staff 4 times as long when compared with less clinically complex CSHCN. Overall, 51% of the encounters were attributable to coordinating care for problems not considered typically medical and included activities such as processing referrals with managed care organizations, consulting with schools or other educational programs, and providing oversight for psychosocial issues. On the basis of national salary and benefits data, the annual cost of the time spent coordinating care for CSHCN in this medical home model ranged from \$22 809 to \$33 048 (representing the 25th and 75th percentiles, respectively).

Conclusions. The costs of providing care coordination services to CSHCN in a medical home are appreciable but not prohibitive. Standardization of care coordination practices is essential because it makes the medical home more amenable to quality improvement interventions. Mechanisms to finance unreimbursable care coordination activities must be developed to achieve the Healthy People 2010 objective that all CSHCN have access to a medical home. *Pediatrics* 2004;113:1522–1528; *cost of medical home-based health care, medical home, care coordination, children with special health care needs, community-based care.*

ABBREVIATIONS. CSHCN, children with special health care needs; AAP, American Academy of Pediatrics; FTE, full-time equivalent; BLS, Bureau of Labor Statistics..

Children with special health care needs (CSHCN) are children “who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or an amount beyond that required by children generally.”¹ This definition of CSHCN, developed by the US Maternal and Child Health Bureau, has been widely accepted by organizations such as the American Academy of Pediatrics (AAP) and Family Voices. Healthy People 2010, the US Department of Health and Human Services’ 10-year agenda for meeting the nation’s health needs, outlines a specific outcome goal related to CSHCN. This outcome goal states that all CSHCN will have access to a medical home.²

According to the AAP, a medical home is a process of delivering care that is family centered, accessible, comprehensive, community based, continuous, coordinated, and culturally effective, and for which the primary care physician shares responsibility.³ A medical home is not a place, a building, or a single institutional structure. It is composed of a coordinated system of care providers focused on supporting the medical and nonmedical needs of a child and a family within their community. Care coordination is the process of developing and implementing a specified care plan by a coalition of different service providers accessing resources in an organized manner.⁴

Families of CSHCN consistently remark on the lack of coordination of care, as well as their need for additional information about resources for their children.⁵ The lack of significant involvement of primary care providers in comprehensively managing care for children with chronic conditions has also been described in other studies.^{6,7}

In a survey of its membership conducted in 2000 by the AAP, 71% of pediatricians self-reported that they always served as the primary care coordinator. However, 41% of pediatricians reported that they always discussed nonmedical needs with families. Twenty-four percent reported that they were always involved with discharge planning from hospital settings. Twenty-four percent reported always having contact with schools on behalf of their patients.⁸

For developing an effective medical home, it is

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essential to understand the competencies that providers in a primary care setting must have to support care coordination. Liptak and Revell⁹ described the principal tasks of care coordination under the guidance of community pediatricians as treatment planning; monitoring outcomes and resource use; coordinating visits with consultants; organizing services to avoid duplication; information sharing among health care professionals, program personnel, and family; facilitating access to services; hospital discharge planning; training of caregivers and local emergency personnel to support CSHCN in the community; and ongoing reassessment and refinement of the care plan.

Ideally, care coordination involves all of the tasks listed above. However, the reality for many primary care physicians is limited time availability and suboptimal or nonexistent reimbursement for these services. The actual cost of care coordination has not been analyzed previously. This article describes and quantifies the resource utilization necessary to provide comprehensive, coordinated care for CSHCN in a community-based, general pediatric practice.

METHODS

Description of Community Practice

Nashaway Pediatrics is a general pediatric practice that was founded in 1990 and is located in a suburban area of north central Massachusetts. It also operates a part-time satellite office in a local underserved area. Nashaway Pediatrics is a component of an integrated delivery system that consists of a medical school; a 1500-physician multispecialty group of community and academic center-based physicians; and a Children's Medical Center that includes 51 pediatric inpatient, 7 intensive care, 4 intermediate care, and 43 neonatal intensive care beds. Nashaway's physicians are affiliated with the Department of Pediatrics at the University of Massachusetts Medical School.

The practice provides care for nearly 5800 patients, ranging in age from newborns to young adults. More than 30% of the Nashaway Pediatrics patients are CSHCN, based on the noncategorical definition published by the Maternal and Child Health Bureau. There are 4.0 full-time equivalent (FTE) pediatricians, 2.7 FTE registered nurses, 1.0 FTE pediatric nurse practitioner, 2.0 FTE medical assistants, and 4.88 FTE clerical and office managerial staff.

Data Collection Tool

For the purposes of this study, a data collection tool was developed to document the types of office-based care coordination activities that took place for CSHCN (Fig 1). The tool was designed so that all office personnel could document accurately the details about encounters with CSHCN that led to specific care coordination activities. The data collection tool was printed on yellow paper for ease of visibility and made available at all workstations throughout the office. Staff members at all levels were encouraged and reminded to complete the form for each nonbillable care coordination encounter that they performed. There is little "free" time in a busy pediatrics office for staff to deal with complex data-recording instruments. The tool had to be easy for all to understand and relatively quick to complete. A meeting was held to instruct the staff on use of the tool and discuss clinical coding examples. During the course of the study, any questions regarding coding were directed to the study staff; however, the learning process was rapid and office staff were able to code independently with few errors or omissions.

The patient's complexity level was one factor that was determined exclusively by the patient's primary care pediatrician. The complexity level assignment was based on the number of involved organ systems; the number of organ systems with a complication; and whether concurrent, family-based social events or stressors had arisen acutely (see Table 1 for criteria). This type of classifi-

cation system has been used successfully by a colleague (D Hirsch, MD, personal communication, September 2002).

Each encounter was assigned an "attribute." The attribute is the general description of the nature of the problem necessitating care coordination. For example, an encounter was considered "typically medical" when it was characterized as being related to a physically based, organic problem. Issues related to breathing problems, gastrointestinal complaints, medication use, rashes, infections, headaches, immunizations, etc, represent "typically medical" attributes. Nontypically medical attributes were ascribed to problems based on psychosocial or mental health; developmental, behavioral, educational, legal, judicial, and nutritional issues; and referral management within managed care systems.

Information about involved organ systems was documented where applicable. Also delineated was the type of care coordination activity involved (eg, telephone discussion, form processing, chart review). When >1 care coordination activity took place as a result of the encounter, >1 activity code was documented. Finally, specific information such as the type of staff, the amount of time spent (rounded to the nearest minute), and whether clinical competence/judgment was required for the care coordination activity was also outlined.

By way of example, consider the case of a child with a learning disability whose parent calls the pediatrics office because the child's educational plan needs amendment. That initial telephone call and request to the pediatrics nurse begins the nonbillable care coordination encounter. The call itself is the first activity documented by the nurse. By reference to the data collection tool (Fig 1), the activities to complete the care coordination encounter, with their corresponding codes could include

- (1b) Discuss with parent via telephone
- (1c) Discuss with school via telephone
- (7) Review chart
- (4) Meet with primary care physician
- (2c) Send out letter to specialist/consultant
- (10) Set up meeting

All of these care coordination activities are required to fulfill the needs of the encounter, and their combined time is recorded. The attribute of the encounter would be (4) educational. Finally, if the nurse determined that a visit to a subspecialist was avoided as a result of this care coordination encounter, then (5) "avoided subspecialist referral" would be noted under "outcome." The use of this study tool was approved by the institutional review board at the University of Massachusetts Memorial Medical Center.


Data Collection Methods

For assessing baseline care coordination activities in this setting, data from all patient encounters (CSHCN and non-CSHCN) were collected on 3 separate 8-hour days using the care coordination tool described. From this baseline data, obtained from a total of 165 patients, it was determined that the average amount of time spent on a care coordination activity was 4.3 minutes. That being the case, during the study period extending from October 19, 2000, through February 28, 2001, all care coordination activities for CSHCN that exceeded 5 minutes were considered for the study. Furthermore, only those activities that were not considered "billable" were included. An activity was considered billable when it could be designated by a *Current Procedural Terminology* system code,¹⁰ and when that code had an assigned value by Resource-Based Relative Value Scale scoring.¹¹ In addition, the activity must have been reimbursable by contractual agreement between Nashaway Pediatrics and public and private insurers. All staff who participated in a care coordination activity during the study period participated in data collection.

RESULTS

During the 95-day study period, 774 encounters that led to care coordination activities were logged, representing service provision to 444 separate CSHCN. Of these 444 patients, 139 (31%) were determined to be in the 2 highest complexity levels (III and IV). Furthermore, this group of patients accounted for 333 (43%) of the encounters that required lengthy care coordination activities. The average

Date	Patient Name / DOB	Complexity	Attribute	Organ System	Activity Code	Outcome	Time Spent	Staff	Clin. Comp	Initial

<u>Complexity Level*</u>			<u>Attribute</u>	<u>Activity Code</u>	<u>Outcome (+referral, -avoided)</u>
<u>Level</u>	<u># Organ Systems Involved</u>	<u># O.S. with complications</u>	1. Psychosocial/ Mental Health a. Patient b. Family 2. Developmental 3. Behavioral 4. Educational 5. Legal 6. Judicial 7. Growth/Nutrition 8. Referral 9. Clinical <u>Organ Systems</u> 1. Neuro 2. Cardiac 3. Pulmonary 4. Musculoskeletal 5. Renal 6. Hematology 7. Skin 8. HEENT 9. Endocrine 10. Infectious Disease 11. GI 12. GYN 13. other	1. Telephone discussion with: a. Patient e. Hospital/Clinic b. Parent f. Payer c. School g. Voc. / training d. Agency h. Other (specify) 2. Contact with Consultant a. Telephone b. Meeting c. Letter 3. Form Processing: eg. School, camp... 4. Meeting with Primary Care Physician 5. Written Report to Agency: eg. SSI... 6. Letter Generated 7. Chart Review 8. Patient-focused research 9. Contact with Home Care Personnel a. Telephone b. Meeting c. Letter 10. Other (specify) <u>Staff</u> RN, MD, NP, MA, Clerical <u>Clinical Competence Code</u> C= Clinical Competence required NC= Clinical Competence not required	1+ Referred for SOV to Nashaway 1- Avoided SOV 2+ Referred for urgent care 2- Avoided urgent care 3+ Referred for emergency care 3- Avoided emergency care 4+ Referred for hospital admission 4- Avoided hospital admission 5+ Referred to subspecialist 5- Avoided subspecialist referral 6+ Referred to community agency 6- Avoided community agency referral 7+ Referred to lab or x-ray 7- Avoided referral to lab or x-ray 8 Unmet needs (specify)  UMassMemorial HEALTH CARE Nashaway Pediatrics § Dev. by R. Antonelli, MD, FAAP Supported by grant 00-MCHB-47A
0	0	0			
I	1	0			
II	1	1			
II	2	0			
III	2	≥1			
III	3	0			
IV	3	≥1			
IV	≥4	0			

modifier S = complicating family or social issues

*By permission of D. Hirsch, MD, FAAP

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Fig. 1. Pediatric care coordination study—data collection tool.

number of encounters per patient during the study period ranged from 1.3 for level 0 and level I to a maximum of 2.8 at level IV. Coordinating care for patients at level I averaged 13 minutes per patient during the study period. This escalated to 48 minutes per patient for level IV. Approximately 1 activity per patient in level 0 was incurred. Two activities per patient were performed in level II, rising to 4.3 per patient in level IV. Overall, patients of greater clinical complexity averaged a higher number of encounters and necessitated a larger amount of time spent in care coordination activities.

Figure 2 demonstrates the average time spent per encounter, stratified by complexity level. It is important to note that there is not a great difference in average time spent per encounter across levels II through IV. However, when a patient's complexity level received the "S" designation, indicating an acute family-based psychosocial complication, the amount of needed time increased at each complexity level.

The outcomes of care coordination are displayed in Table 2. Twenty-one percent of encounters resulted in a referral to our office for a sick office visit,

TABLE 1. Medical/Behavioral/Psychosocial Complexity Levels

Complexity	Description
0	Well child, no significant chronic medical/behavioral/psychological problems
1	One moderate or severe medical/behavioral/psychological problem involving 1 organ system without medical/behavioral complications.
1s*	
2	One moderate or severe medical/behavioral/psychological problem involving 1 organ system with medical/behavioral complications or involvement of 2 organ systems without complications.
2s	
3	Two or more moderate or severe medical/behavioral/psychological problems involving 2 organ systems with complications or 3 organ systems without complications.
3s	
4	Three or more moderate or severe medical/behavioral/psychological problems involving 3 or more organ systems with medical/behavioral complications or 4 or more organ systems without complications.
4s	

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* "s" modifier denotes the acute onset of complicating family or social issues.

whereas 26% resulted in avoidance of an office-based sick visit. Twenty percent of encounters resulted in referral to a subspecialist, whereas in 4% of encounters, patients were able to avoid subspecialty referral. Nine percent of encounters resulted in referral for a laboratory or radiologic evaluation, whereas 0.3% avoided such an evaluation. Five percent of encounters led to referral to a community agency. Two percent of encounters produced a referral to an emergency department, whereas 1% avoided emergency department referral. Two percent of encounters led to direct hospital admission. One percent of encounters led to avoidance of urgent care referral, whereas 0.4% were referred to urgent care. Eight percent of

encounters were unable to meet the needs of the family and patient despite diligent effort. Outcomes were recorded only as single events resulting from each encounter. For example, if a patient was referred for an office visit, then avoidance of hospitalization was not recorded. If a particular outcome was avoided, then it was because a specific activity related to care coordination was performed. Nineteen percent of encounters had no specific outcomes reported. These represented telephone-based encounters that did not encumber or avoid a visit.

The staff assessed the appropriateness of their training for the performance of each care coordination activity. Clerical staff believed that 3 of 53 encounters would have been more effectively managed by a person with clinical training. Thirteen of 234 encounters by the nurses were believed to be activities that nonclinical staff could have executed. Only 1 of the 415 physician encounters was determined to have been able to be handled by nonclinical staff.

The distribution of activities performed during the study is summarized in Table 3. A total of 1107 activities were characterized. Significantly, 53% of activities involved telephone contact with the patient, the family, or a hospital or clinic. Overall, 41% of all activities in the study involved telephone contact between Nashaway Pediatrics staff and either a parent or the patient directly. Chart review (defined as more than a 5-minute examination of the patient's chart) composed 17% of the activities, and 12% involved contact with consultants. It is also important to note that of the 774 care coordination encounters, 73% involved telephone contact as an integral part of the encounter.

Of 1081 recorded attributes, 527 (49%) were classified as typically medical, whereas 554 (51%) were nontypically medical. Of the nontypical attributes, 34% were related to processing referrals with managed care organizations, 28% were based on psychosocial needs, 14% were related to educational pro-

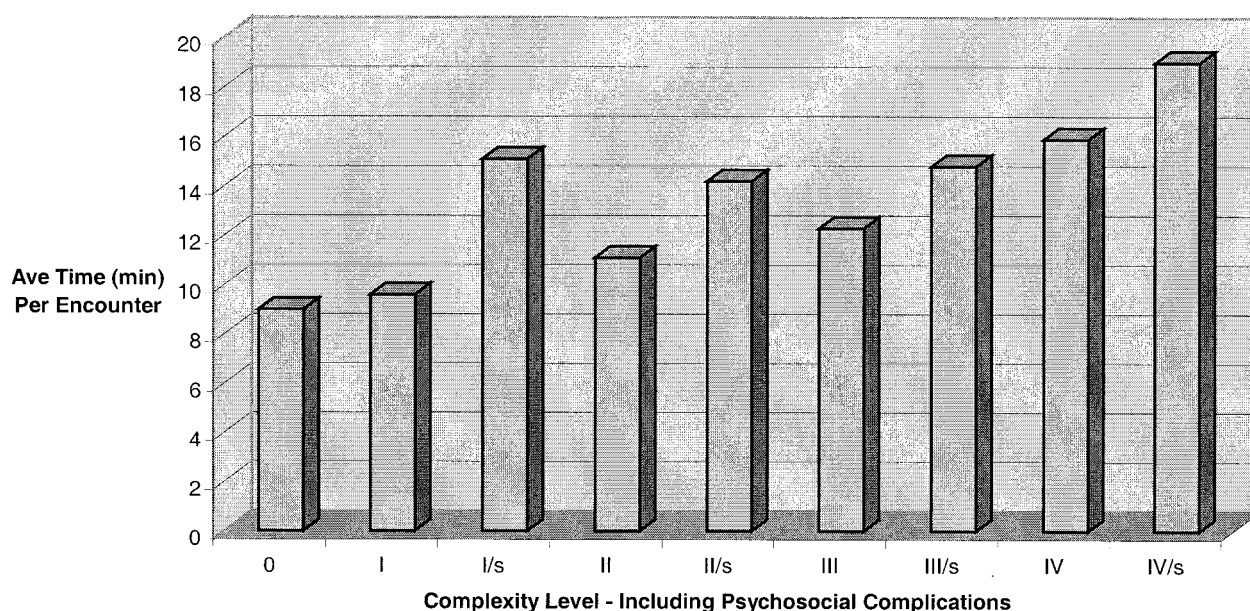


Fig. 2. Time spent per encounter as function of complexity.

TABLE 2. Outcomes of Care Coordination

Outcomes	Total Reported, %
Avoided sick office visit	26.0
Referred to Nashaway Pediatrics for sick office visit	21.0
Avoided subspecialist referral	4.0
Referred to subspecialist	20.0
Avoided lab/x-ray	0.3
Referred to lab/x-ray	9.0
Avoided community agency referral	0.3
Referred to community agency	5.0
Avoided emergency department	1.0
Referred to emergency department	2.0
Referred for hospital admission	2.0
Avoided urgent care	1.0
Referred to urgent care	0.4
Unmet needs	8.0
Encounters without reported outcomes	19.0

gramming for our patients, 10% were behavioral, 7% were developmental, 6% were growth and nutrition, and < 1% were legal issues. Note that 71% of encounters had only a single attribute, whereas 29% had multiple attributes coded.

Of the 951 organ systems coded, 14% were related to otolaryngologic, 13% to gastrointestinal, 12% to neurologic, 11% to psychological, 10% to pulmonary, 8% to infectious diseases, 7% to renal, 6% each to musculoskeletal and endocrinologic, 4% to dermatologic, 2% cardiologic, and 7% to miscellaneous systems.

Table 4 demonstrates the distribution of care coordination encounters across staff type within the practice. Fifty-five percent of encounters were performed by pediatricians, 30% by nurses, and 6% by clerical staff. Pediatricians averaged 14.5 minutes per encounter and accounted for 64% of the total time spent doing care coordination during the study. Using salary and benefits data compiled by the US Bureau of Labor Statistics (BLS), Division of Occupational Employment Statistics,¹² Table 4 also displays the hourly and annualized costs for each staff type. Table 4 reflects costs across the range of BLS-reported data from the 25th percentile, the median, and the 75th percentile. Therefore, the cost of care coordination accounting only for staff time use in this medical

TABLE 3. Distribution of Activities Related to Care Coordination

Activities	%
Telephone contact with any party	53
Of all telephone-related activities	
Parent	69
Hospital/clinic	11
Pharmacy	5
Payer	3
Agency	3
School	1
Unspecified/miscellaneous	8
Chart review	17
Contact with consultant	12
Letter generation	7
Form processing	5
Convene meeting with primary care pediatrician	4
Patient-focused research	1
Contact with home care personnel	1
Total activities during study: 1107	

home model ranges from \$22 809 (if provider and staff costs are at the 25th percentile) to \$28 500 (at the median), to \$33 048 (at the 75th percentile).

DISCUSSION

It is generally believed that quality office-based care coordination is an essential part of good primary care. It certainly is an integral part of the medical home model. How does one determine the activities that are necessary for office-based coordination of care, and which staff are routinely performing these activities?

This descriptive study demonstrates that nonbillable care coordination activities can be measured within a busy general pediatrics office. The tool collects objective data about which staff are providing which care coordination services to which patients and assists with calculating the "cost" (nonbillable time) of providing these services. Subjective data regarding clinical competence and outcomes of care coordination activities can also be measured.

The Nashaway Pediatrics medical home model uses a physician-driven method for assigning specific care coordination tasks. Ultimately, the physician has the overall responsibility for the outcome of a given intervention. In general, tasks that require administrative capabilities are assigned to nonclinical staff (eg, referral management for patients covered by managed care plans). Tasks that require clinical assessment and outcome monitoring are assigned to nursing staff. Tracking of laboratory results and booking procedures is generally assigned to medical assistants. Patients and families with significant clinical and/or psychological complexity are often handled directly by the physicians or by a team approach using a physician and a pediatric nurse practitioner or a registered nurse. As evidenced by the low percentages of discordance between task requirements and necessary competencies to perform a given care coordination activity, this assignment method seems to work well; however, it does result in a physician's being involved in 55% of the care coordination encounters. For supporting this paradigm, it is essential to develop a well-defined, documentable, and auditable framework of care coordination activities. Because physician productivity is often measured by resource-based relative value units, it is important to develop a system of care coordination codes that have assigned resource-based relative value units and that therefore legitimately contribute to a provider's measured productivity.^{11,13}

It is clear that not all aspects of care coordination need to be performed by physicians. Medical home training opportunities can focus on providing guidelines for care coordination performance across staff types. In fact, for the sake of cost efficacy, many of the functions that compose office-based care coordination may be more economically conducted by appropriately trained and supervised nonphysician support staff.

This project demonstrates an appreciable but not prohibitive cost, as determined by staff time, of providing a comprehensive array of care coordination

TABLE 4. Measurement of Care Coordination Services

	Nashaway-Specific Data			BLS Provider Cost (Hourly)*			Study Period Cost		
	Encounters, %	Time Spent, %	Hours	25%	50%	75%	25%	50%	75%
Physician	55	64	103.2	\$61.00	\$76.59	\$88.20	\$6295	\$7904	\$9102
Nurse practitioner	8	8	12.8	\$30.11	\$38.75	\$46.29	\$384	\$496	\$593
Registered nurse	30	20	32.7	\$23.75	\$28.27	\$33.86	\$777	\$924	\$1107
Medical assistant	1	3	4.7	\$12.06	\$14.30	\$16.96	\$57	\$67	\$80
Clerical	6	5	7.3	\$12.31	\$14.94	\$18.42	\$90	\$109	\$134
Annualized staff cost							\$22 809	\$28 500	\$33 048

* Hourly includes salary plus benefits.

services within a community-based, general pediatrics practice striving to provide a medical home. The annualized cost of care coordination in this medical home model ranges from \$22 809 (at the 25th percentile) to \$33 048 (at the 75th percentile).

The relatively even distribution of a wide range of organ systems and attributes reflects the breadth of problems that are managed with family-centered care coordination in our general pediatrics medical home model. Striking is that 73% of care coordination encounters involve telephone contact. For families, this is advantageous: it saves a trip to the physician's office. For the practice, it is not economically sustainable because few third-party payers reimburse for telephone management efforts.

It is surprising to note that the presenting problems that lead to implementation of care coordination services are divided equally between typically and nontypically medical attributes. This emphasizes the role that the primary care portion of the medical home plays in caring for CSHCN. Namely, nonmedical problems are as common and as significant as "typical" medical issues in contemporary pediatrics.^{14,15} Processing of referrals with managed care organizations and psychosocial issues account for 62% of the nontypically medical attributes.

Given the constraints of a small sample population, there are suggestive trends to the data. Patients of greater clinical complexity average a higher number of encounters and necessitate a larger amount of time spent in care coordination activities. The actual amount of time spent per encounter does not vary much across complexity levels; however, when a patient's complexity level receives the "S" designation, indicating an acute, family-based psychosocial complication, the amount of time needed increases at each complexity level.

Because of the paucity of outcome data in the literature relating to office-based care coordination activities, this study attempts to categorize each of the 774 encounters according to whether a subsequent subspecialist or emergency department referral, office or hospital visit, or laboratory/radiograph study occurs or is avoided as a result of the specific care coordination encounter. For the 627 encounters with documented outcomes, 59% result in referral for a visit or testing. In 33% of the encounters, the staffperson does not make a referral and subjectively determines that the guidance that they provide to the patient and the family results in avoidance of an

office visit, subspecialist referral, or testing. It is essential to note that care coordination services are provided through care plans that are jointly developed between families and practice-based staff. Therefore, avoidance of certain outcomes should be viewed as a consequence that is desirable for the families.

There are several weaknesses in this study design and execution. Because Nashaway Pediatrics is a full-time, general pediatrics practice, it is likely that during the busy winter season, care coordination encounters were not recorded. This sampling error is compounded by the amount of nonbillable care coordination time routinely performed by pediatricians after hours and on weekends. No formal mechanism for recording "on-call" care coordination was built into this study. In addition, 1.0 FTE physician and 0.8 FTE registered nurses were not working during portions of the study because of medical leave. The former missed 8 weeks and the latter missed 6 weeks. Because care coordination activities may often be shared by several staff for the same patient, defining single activity codes may not clearly reflect the number of staff involved in coordinating care. Therefore, the largest sources of error in this study would lead to underreporting of time spent. There are limitations to the use of salary and benefits data for pediatricians compiled by BLS. The national database excludes self-employed physicians and combines data from pediatricians across diverse practice settings (eg, private practice, hospital based).

Although this study describes only 1 of many models of care provision, it provides a conceptual framework to enable analysis of care coordination in other settings that endeavor to provide medical home-based, family-centered care. In future studies, the basic elements of this study's methods need to be refined and applied to evaluating a range of primary care practices to determine how patterns of care coordination vary as a function of demographics, economics, and geography. Subspecialty clinics that aspire to provide medical homes for children with rare or complex disorders (eg, human immunodeficiency virus clinics, metabolic disease clinics, oncology clinics) will be able to describe qualitatively what they do to provide comprehensive care coordination. These services then can be measured quantitatively, and resource utilization can be assessed in terms of time and cost.

To achieve the outcome goals of Healthy People

2010, much work must be done to enable providers to categorize, document, and subsequently receive compensation for work performed under the rubric of care coordination. This will standardize care coordination practices, make them amenable to continuous quality improvement methods, and begin truly to support all of the needs of families and providers within the framework of medical homes. Without the ability to support care coordination services at the level of the community-based medical home, significant barriers to achieving the Healthy People 2010 objectives will remain.

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